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It had not been shown, until Hertz's experiments were made, that the vibration of an electric current would set up disturbances in the surrounding medium, — the assumption on which Maxwell's theory was based. Hertz proved this in the following way: conducting circuits have definite time-constants, just as stretched strings have definite periods of vibration; and a disturbance whose period is the same as the time-constant of the circuit will produce a greater effect than any other, just as a piano-string will vibrate if one sings the note to which it corresponds. Hertz produced electric vibrations of a short and definite period, — one hundred millionth of a second, of a wave-length of about two metres, — and studied the effect on a receiving-circuit of the same time-constant. The receiving-circuit had a short air-space in it, and sparks were observed leaping across this space. By placing the vibrator several wave-lengths from a reflector, and moving the receiver between the two, he observed that at certain distances the induced sparks were faint; then, on moving the circuit, they became brighter, then disappeared again, — phenomena exactly resembling Lloyd's bands in optics, due to interference. To quote Professor Fitzgerald, "Henceforth I hope no learner will fail to be impressed with the theory — hypothesis no longer — that electro-magnetic actions are due to a medium pervading all known space, and that it is the same medium as the one by which light is propagated; that non-conductors can, and probably do, as Professor Poynting has taught us, transmit electro-magnetic energy. By means of variable currents, energy is propagated into space with the velocity of light."

The experiments of Hertz have made Maxwell's theory of light more than possibly true, and it seems as though light must be hereafter considered as an electro-magnetic phenomenon.

A NEW SYSTEM OF ELECTRICAL DISTRIBUTION BY STORAGE-BATTERIES. — Mr. Henry Edmunds has brought out a new system of distribution by storage-batteries, that seems to have a good deal of merit. The systems that have been used have objections which Mr. Edmunds obviates. Mr. Crompton's plan for using batteries is to have a number of groups in series on the main line, taking the current for distribution from the ends of each group. The batteries are connected with the charging and discharging circuits at the same time. The obvious disadvantage of this plan is that a high potential cannot be used, since the lamp-circuit is liable to have its potential raised to the maximum of the charging circuit; and, with more than four hundred volts difference of potential at the dynamo terminals, this would be distinctly unsafe. The other system consists in having two sets of cells, one of which is being charged while the other is discharging. Mr. Edmunds's is a modification of the latter plan. If he wishes forty-eight volts in the lamp-circuits, he uses thirty-two cells, divided into four sets of eight cells each. Three sets in series are constantly connected with the lamp-circuit, while the fourth set is being charged. A device is provided by which the various sets are put in rotation in the charging and discharging circuits, remaining two minutes in the former, six in the latter. In changing from one circuit to the other, a resistance is put in place of the battery being charged, so the main circuit is never broken. By putting two sets in parallel for an instant, a break in the lamp-circuit is avoided. This plan has the advantage of allowing high electro-motive forces to be used without necessitating a double outfit of batteries; and the efficiency should be greater than when the cells are charged for a considerable period and then discharged.

BOOK-REVIEWS.

The Aryan Race. By CHARLES MORRIS. Chicago, Griggs. 12°. $1.50.

THE present volume is a concise and pleasantly written review of the results of recent investigations on the home and history of the Aryan race. It is intended to be a popular book; and its object — to make clear to the general reader these interesting questions and their solutions, so far as reached to-day — has been well accomplished. The author is careful to give the evidence favoring the various theories as to the origin of the Aryans; and, although he states as his own view that they probably originated in south-eastern Europe, he does not urge his opinion upon the reader, but allows him to draw his own conclusions from the evidence offered. In an introductory chapter the author discusses the division of mankind into races, and claims that the Caucasians are a branch of the Mongols. He even goes so far as to divide mankind into two races, — the Mongoloid and Negroid. Anthropologists will hardly concur with the author's views expressed in this chapter. He next sets forth very candidly the arguments advanced by various writers as to the early home of the Aryans, and continues to trace their migrations as compared to those of other races. From linguistic evidence he describes their early stage of culture, their ancestral and nature worship, and their political development. When the author, in the chapter on the development of language, turns to consider languages other than Aryan, he is somewhat too sweeping in his statements regarding them, and we find throughout the book that the author's desire to eulogize the Aryan race has led him to underestimate the merits of the rest of mankind. The history of the Aryans is followed in general outlines up to the present time; and the book concludes with a glowing prospect of the future, the author assuming that even the fastnesses of Central Africa will become the home of the conquerors of the world.

On the Study of Words. By R. C. TRENCH. New York, Macmillan. 16°. $1.

THIS is the twentieth edition of Archbishop Trench's charming book, revised by A. L. Mayhew. The editor has not made any change in the arrangement of the book, but he has purged it of all erroneous etymologies, and corrected in the text small matters of detail, according to the recent advances of the science of philology. He has done well in altering as little as possible of the author's work, for it would be hardly possible to increase the attractiveness of Trench's style, and of his method of treating his subject. He has set forth the charms of the study of etymologies in a way that can hardly be improved, and that will make every reader a friend of this science. It will also induce the reader to a thoughtful use of words; to considering their "poetry and morality," to use the author's words. It is hardly necessary to recommend the interesting little volume, for the fact that it was necessary to publish a twentieth edition is sufficient proof of its great merits.

The Essentials of Geography. By G. C. FISHER. Boston, N. E. Publ. Co. 8°.

THIS is one of the old-style geographies, which are of no educational value, and only adapted for rote work. It is the briefest possible compilation of geographical facts, arranged without any geographical or educational method. The statements are extremely meagre, and the author has not been sufficiently critical in selecting them to make his book an 'authority,' as he expresses himself in the preface. The book is accompanied by sketch-maps, by the use of which the author hopes to enliven the teaching of geography; which, however, are also only useful for a teacher who is satisfied with routine work, and with cramming the minds of his pupils with facts.

How the Peasant Owner Lives. By LADY VERNEY. London and New York, Macmillan. 12°. $1.

LADY VERNEY has collected some descriptions of the life of peasant-owners in France, Germany, Italy, and Russia, with the object of defending the large English and more particularly Irish estates. She dwells on the fact that small estates cannot be worked economically, especially where they consist of small detached sections. She shows more particularly the evil results of this system in France. The authoress sees the only remedy against these effects in the consolidation of these small estates in the hands of great land-owners and the abolishment of small farms. Her ideal is that the small farmer should not try to make his living out of the produce of his little patch of land, but that he should become a laborer on a large estate. She deems the attempts to consolidate farms, that have been made on the European continent, unimportant, and also hardly touches the state of the workingman-peasants, who earn money as workers in factories, but at the same time own small patches of land on which they raise some of the necessaries of life. From this point of view, she condemns the efforts to create a peasantry in Ireland, and concludes her book with a touching romance, 'A Yeoman's Home in the Dales Sixty Years since.'